

REMARKS

Reconsideration of this application is respectfully requested in view of the foregoing amendment and the following remarks.

By the foregoing amendment, claim 16 has been amended, and new claim 18 has been added. Thus, claims 1-18 are currently pending in the application and subject to examination.

Information Disclosure Statement

Please forward a signed, initialed and dated copy of the Information Disclosure Statement filed December 23, 2004.

Double Patenting

In the outstanding Office Action claim 16 was objected to under 37 C.F.R. § 1.75 as being a substantial duplicate of claim 1. Claim 16 has been amended responsive to the objection. If any additional amendment is necessary to overcome the objection, the Examiner is requested to contact the Applicant's undersigned representative.

Rejection Under 35 U.S.C. § 101

In the outstanding Office Action claims 1-17 were rejected under 35 U.S.C. § 101 as allegedly being directed to non-statutory subject matter. In making this rejection, the Examiner asserts that claims 1-17 recite an "abstract idea" and fail to provide a tangible result. However, in claim 1, the second means performs information processing according to an application on the basis of the information calculated based on the differences by the first means and provides an output according to the application. Thus, the invention as recited in claim 1 produces the useful and tangible result of an output according to the application. The output may vary in accordance with the

application. Examples of such applications are disclosed in the specification as filed at, for example, page 29, lines 4-8, and step 52 of Fig. 10.

Accordingly, the Applicant submits that claim 1, as well as claims 2-17, which depend therefrom, are in compliance with 35 U.S.C. § 101.

Withdrawal of the rejection of claims 1-17 under 35 U.S.C. § 101 is therefore respectfully requested.

Rejections Under 35 U.S.C. § 103

Claims 1-17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Manwaring, U.S. Publication No. 2002/0098897 in view of Numazaki et al., U.S. Patent No. 6,144,366 and Poillon et al., U.S. Patent No. 5,056,791. It is noted that claims 10 and 17 have been canceled, and claims 1 and 2 have been amended. To the extent that the rejection remains applicable to the claims currently pending, the Applicant hereby traverses the rejection, as follows.

In the Applicant's invention as recited in independent claim 1, as amended, a second means is provided for performing information processing according to an application on the basis of information calculated based on the differences by the first means to provide an output according to the application, wherein the object to be imaged by the imaging means includes a retroreflective body.

Manwaring relates to a general strobe scope for observing the state of a moving body by continuously lighting the moving body, which is described in the subject application at page, lines 1, lines 3-8 as "Patent Literature 2." As described in the subject application with respect to FIG. 5B, in the claimed invention, the camera is activated during the lighting period of the flash unit, and the camera is made non-active

during the non-lighting period. As noted by the Examiner at page 4 of the outstanding Office Action, no difference image is produced by Manwaring.

Manwaring is silent regarding an inadvertent appearance of room light and sunshine (e.g., from a window), etc. and/or the removal thereof. That is, Manwaring is silent regarding the removal of noise created by a light that is not a reflection light from a reflection point of the golf club because in Manwaring, as clearly disclosed by Figure 2 thereof, the camera is arranged so as to overlook the golf ball, and therefore, it is unnecessary to consider any inadvertent appearance of room light and/or light from a window, etc. The camera in Manwaring is used for detecting the swing of the golf club, and thus, the camera in Manwaring is arranged at a position capable of overlooking the golf ball or a position at the same height position of the golf ball. Furthermore, in Manwaring, the reflection point of the golf club is constituted by the high reflection material, and the flash unit generates a light stronger than the room light (room light being generally constituted by ambient light in the room including any room lighting in addition to any light from a window, etc.) Therefore, even when ambient room light (e.g., from lighting fixtures and/or a window) is present, the reflection point in Manwaring has an intensity higher than that of the ambient room light. Therefore, it is possible to easily detect the reflection point in Manwaring without considering ambient room light such as from room lighting and/or a window, etc. As such, Manwaring does not mention or even consider noise elimination from ambient light such as room lighting and/or a window, as recited in the claimed invention.

Moreover, there is no reason to modify Manwaring with Numazaki as suggested by the Examiner, because to do so would render the device and method of Manwaring

unnecessarily cumbersome, since Manwaring is not concerned with any inadvertent appearance of room light and/or sunshine (such as from a window, for example).

Further, Numazaki discloses by that by calculating the difference (the image from the camera), the finger of the hand is extracted, the center of gravity thereof is evaluated, the cursor is displayed on it or the command corresponding to the movement of the finger tip is output, or the gesture of the extracted hand is interpreted, and the interpreted gesture is converted into the command.

As described at col. 3, lines 26-39 thereof, Numazaki teaches away from attaching color markers or light emitting devices to a hand or other part of a human body. Thus, there is no suggestion in the alleged combination of Numazaki and Manwaring to attach the reflection point for the golf club in Manwaring to a body part in Numazaki. Moreover, based on the descriptions thereof, the Applicant submits that it is not possible for those skilled in the art to apply Numazaki to Manwaring as suggested by the Examiner.

Furthermore, in Numazaki, prior to the detection of the center of gravity, it is necessary to detect a stick-like member and cut out a tip of the stick-like member (see, e.g., FIG. 9 and the description thereof, in Numazaki). Accordingly, the processing burden in Numazaki is far greater than that in the invention as claimed. For example, in Numazaki, since the hand of a person is imaged, it is necessary to perform processing for finding a tip of a finger that is the object to be detected and to cut out the object to be detected (i.e., the tip of the finger). Since the tip of the finger is a portion of the hand, in order to detect the tip of the finger in Numazaki, it is necessary to perform a process for finding a specific part within a same body. Accordingly, the processing necessary in

Numazaki is significantly more complex than in the claimed invention. Moreover, Numazaki fails to disclose or suggest a retroreflective body, which is the image itself and the object to be detected, as recited in the claimed invention. Thus, by the claimed invention, it is not necessary to perform processing for finding and cutting-out a specific portion from an image, as disclosed by Numazaki.

Therefore, according to the present invention, not only it is possible to eliminate a noise due to the disturbance by a simple processing such as difference detection but also to reduce a process burden in comparison with Numazaki.

Further still, in Numazaki, as described at col. 16, lines 35-45, and col. 12, lines 13-37 thereof, an obtained difference image is a range image. Therefore, the pixel value of the image sensor (reflected light amount) becomes small in a case that the imaging object is far from the image sensor, and the pixel value becomes large in a case that the imaging object is close to the image sensor because the pixel value of the image sensor is in inverse proportion to the square of the distance to the imaging object if the surface of the imaging object is an even dispersing surface. Therefore, in Numazaki, in a case that a body exists at a position nearer to the image sensor than the imaging object to be extracted (e.g., a hand), a body that is not intended to be extracted appears strongly in the difference image.

In the claimed invention, because the imaging object includes a retroreflective body, the reflection light amount is not in inverse proportion to the square of the distance to the imaging object. Therefore, the reflection light amount from the retroreflective body is larger than the reflection light amount from the imaging object having the even dispersion surface, and thus, the retroreflective body appears strongly

in the difference image, because, for example, the reflection light from the retroreflective body returns strongly to the imaging means. In addition, the background, etc., almost have surfaces that are even dispersion surfaces, and therefore, the amount of the reflection light from each of them is in reverse proportion to the distance to the imaging means. Accordingly, in the claimed invention, the light image from the retroreflective body appears in the difference image strongly and clearly in comparison to the light image of the background, etc., that are not extracted.

Furthermore, in the claimed invention, in a case in which another body exists at a position closer to the image sensor than the imaging object to be extracted, i.e. the retroreflective body, the light image from the retroreflective body appears in the difference image more strongly and clearly than does the light image of such other body because the other body has a surface that is generally an even dispersion surface and thus, the light amount of the reflection light from the other body is inversely proportional to the distance between to the square of the distance to the imaging object, while the retroreflective body is not. Thus, the claimed invention is entirely different from Numazaki.

Moreover, in Numazaki, the difference image is a range image as described above, and therefore, if the distance between the image sensor and the imaging object is changed, it is impossible to accurately extract the object. Numazaki points out such a problem in col. 70, line 15 to col. 71, line 13. In addition, in col. 71, lines 3-13, Numazaki discloses the difficulty for taking the object image at the optimum position with respect to the image sensor. In order to overcome such problems, Numazaki discloses that by controlling the light emitting amount in accordance with the distance

between the image sensor and the object, the reflection image of the object is accurately obtained (see, e.g., Numazaki at col. 71, lines 19-25 and col. 75, lines 1-16).

In view of the above, it is obvious that in Numazaki, it is necessary to provide additional circuits and controls to avoid the problems described therein and above, whereas in the claimed invention, it is possible to solve at least such problems simply and cheaply, without additional circuits and controls, by using the claimed retroreflective body as the imaging object.

Further, in Numazaki, it is necessary to provide a light emitting device capable of emitting a strong light because it is necessary to image the hand (i.e., body part) having an even scattering surface. In contrast, by using the claimed retroreflective body, it is possible to recognize the retroreflective body far from the imaging means even if the light amount is small. Thus, the claimed invention further provides energy savings over Numazaki.

For at least these reasons, the applicant submits that Manwaring and Numazaki, taken alone or in combination, do not disclose or suggest at least the features of a second means for performing information processing according to an application on the basis of the information calculated based on said differences by said first means to provide an output according to said application, wherein said object to be imaged by said imaging means includes a retroreflective body, as recited in independent claim 1, as amended.

Poillon is not cited for, nor does Poillon disclose or suggest the deficiencies of the combination explained above.

Accordingly, the Applicant submits that amended claim 1 is allowable over the applied art of record. As amended claim 1 is allowable, the Applicant submits that claims 2-17, which depend from allowable claim 1, are likewise allowable for at least the reasons set forth above with respect to claim 1.

In addition, the Applicant submits that the Examiner misunderstands the difference between the invention as recited in claim 2 and Manwaring. In Manwaring, triggering is performed by detecting the interruption of a laser beam by a receiver. In the outstanding Office Action, the Examiner asserts that such triggering corresponds to the first means for calculating a part or all of information of a position, a size, a velocity, an acceleration, a moving path pattern of an object on the basis of differences between a plurality of image signals at light-emission and a plurality of image signals at non-light emission, as recited in claim 1. However, the triggering in Manwaring is based on the signal of the receiver and not on the image from the camera. The determining means of claim 2 determines whether the information based on the difference (i.e., the image from the camera) is coincident with a predetermined condition, which is different from the triggering operation disclosed by Manwaring.

The Applicant further submits that the Examiner misunderstands the difference between the invention as recited in claim 3 and Manwaring. In Manwaring, the triggering is performed by detecting the interruption of the laser beam by the receiver. In the outstanding Office Action, the Examiner asserts that the triggering of Manwaring is the "valid information" recited in claim 3. However, the valid information as recited in claim 3 is calculated based on the camera image, whereas the triggering in Manwaring is detected by the receiver, and not a camera.

Accordingly, the Applicant submits that claims 2 and 3 are allowable over the applied combination of references for at least these additional reasons, as well as the reasons set forth above with respect to claim 1, from which claims 2 and 3 depend.

New Claim 18

The Applicant submits that none of the applied art of record, taken alone or in any combination thereof, discloses or suggests at least the features of an imaging step for imaging an object including a retroreflective body at a light-emission and at a non-light-emission of said stroboscope to output an image signal at light-emission and an image signal at non-light emission; a first step for calculating a part or all of information of a position, a size, a velocity, an acceleration, a moving path pattern of said object on the basis of differences between a plurality of said image signals at light-emission and a plurality of said image signals at non-light emission; and a second step for performing information processing according to an application on the basis of the information calculated based on said difference by said first step to provide an output according to said application, as recited in new claim 18.

For at least this reasons, the Applicant submits that new claim 18 is allowable over the applied art of record.

Conclusion

For all of the above reasons, it is respectfully submitted that claims 1-18 are in condition for allowance and a Notice of Allowability is earnestly solicited.

Should the Examiner determine that any further action is necessary to place this application into better form, the Examiner is invited to contact the undersigned representative at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants hereby petition for an appropriate extension of time. The Commissioner is hereby authorized to charge any fee deficiency or credit any overpayment associated with this communication to Deposit Account No. 01-2300 referencing client matter number.

Respectfully submitted,

Arent Fox, LLP

A handwritten signature in cursive script, reading "Sheree Rowe", written over a horizontal line.

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